

YEAR 2002 DEFENSE STANDARDIZATION PROGRAM AWARD NOMINATION  
MARTIN L. SNYDER - LED, IR SECURE, MULTIVOLT BLACKOUT DRIVE LAMP

**Point of Contact**

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**Name of nominee**

MARTIN L. SNYDER

**Nominee's organization**

US Army TACOM; TARDEC; Engineering Business Group; Team Power; AMSTA TR E/PWR

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**Title/position/grade**

Electrical Engineer/850/GS-13

**Brief description of accomplishment:**

Development of an all light emitting diode (LED), IR secure; multivolt Blackout (BO) Drive Lamp legacy system that will retrofit all present and past tactical wheeled vehicle systems; all commercial construction equipment assets so equipped and some major combat vehicle assets. Mr. Snyder provided both engineering and testing guidance throughout the development stages by specifying performance requirement parameters, establishing limits and testing requirements. This effort has been put into production starting as of JUN02 on the Palletized Load System (PLS); Heavy Expanded Mobility Tactical Truck (HEMMT) and the Heavy Equipment Transporter System (HETS). The payoff is in greatly increased reliability of the BO Lamp, resulting in increased readiness and reduced logistics footprint, all at a significantly reduced cost per unit.

**Background:**

The need for a new military BO Drive Lamp has been around for at least 20 years. The technology solution using LED's of sufficient high power output has only recently been available in the last four to six years. The majority of the old BO Drive Lamp designs was in 24 volt and used an incandescent lamp design that was very prone to failure. Then, along came the LED. LED's are now into what is termed "generation 2" in the industry. It is as a result of these recent technology improvements, new powerful outputs, and wavelength variety (colors) that LED's have provided the opportunity to design a new, cost effective, radically improved, IR Secured BO Drive Lamp. The choice of using LED's also allows a "multivolt" solution to retrofit and current production. The new BO Drive will not only fit everything the Army manages, but will operate on 12 or 24-volt systems. Standardization across platforms was one of the primary goals.

**Problem / Opportunity:**

The 24-volt incandescent lamp filament was the inherent and chronic problem. To make a 24-volt lamp filament it must be much thinner in cross section than an equivalent (in power) 12-volt lamp currently found on commercial automobiles. This thinning makes the lamp more susceptible to vibration failure. Adding to the problem is design of military vehicle systems and the various terrain types that they must traverse. The technology solution of the LED gave the Army an opportunity to correct this situation.

**Discussion:**

The Heavy Tactical Vehicle, Project Managers Office was looking for a lead engineer to develop, design and qualify a whole new line of all LED external lighting and signaling lamps. Starting about two years ago Mr. Snyder volunteered to direct and accomplish this undertaking. There are essentially four types of vehicle external lamp assemblies involved in this effort: Front turn and BO marker; Rear turn, stop and BO Marker w/stop; side markers in amber and red; and the BO Drive Lamp. Upon completion of the BO Drive Lamp, the external illumination of the PLS, HET and HEMMT Systems are now all-LED based designs. The Headlamps are the only incandescent device remaining. (However, Mr. Snyder has initiated development of a headlamp replacement). Mr. Snyder selected a NATO STANAG 4381 for the BO requirements that he helped develop some years earlier. Using this NATO STANAG and current Department of Transportation (DOT) and SAE standards the four LED devices were developed. All externally lighting and signaling equipment devices are 12/24 multivolt, IR Secured and meet all requirements of the NATO Stanag 4381 providing interoperability with NATO forces. Further, if the commercial automotive/truck industry moves to using 42 volt electrical systems as proposed in or near the year 2010, the Army now will have the solution in lighting simply by easily modifying the multivolt use to 42 volts.

**Nominee Involvement:**

Starting about two years ago Mr. Snyder initiated the development of the all LED Legacy solution to the military's lighting dilemma. He pledged that the soldier was going to get as results of this project "The best BO Lamp that technology can provide". And would not quit until it was done. The most difficult task would be the BO Driving Lamp. The BO Drive Lamp has been rife with many problems historically. The safety of our soldiers has been at stake both during peacetime and conflict. Too little light for the soldier/driver has been the norm in the past resulting in accidents and injuries. Mr. Snyder chose to use the NATO Stanag 4381 as guidelines for all of the BO lamp designs and hence testing parameters. Emphasis and engineering direction by Mr. Snyder was made to the contractor Truck-lite Co, Inc; Falconer, NY during meetings, that the newly developed BO Drive Lamp would have to meet a number of challenges and criteria testing. The first proposed solution was put on the table. It was a good attempt but would not fit all vehicles. Two more prototype attempts were made. Mr. Snyder suggested that he and the Truck-Lite engineer spend some time examining all of variety and diversity of specialized military rolling assets in the field including the National Guard. Following this field examination the envelope design was determined so as to accommodate form and fit. The envelope will fit almost all assets past and present. Function was left to complete the design. The NATO STANAG 4381 allows a range of light output. Mr. Snyder continued to emphasize at contractor meetings the need to provide sufficient light for the soldier/driver. Mr. Snyder suggested that 4 different prototype lamps be made with increasingly higher light output that would all meet the

standard. Mr. Snyder asked for and got from the contractor a testing area of total blackout conditions on a moonless night. The four proposed prototype lights were tested in a horse stadium at 11:00 PM during the winter months at about 24 degrees. Mr. Snyder made the most critical engineering decision of the BO Lamp that night.

TESTING: There are a lot of ways to accomplish this final proof. Mr. Snyder selected testing procedures, parameters and criteria based on his experience in the field and his professional experience. He tested/witnessed the new lamps at three different sources (the contractor's site, independent test facilities and Aberdeen Proving Ground). Mr. Snyder compared all data. All data supported successful completion of the new lamp designs. One thing left and the most important: THE SOLDIER. Mr. Snyder initiated, coordinated and actively got involved with 30 PLS trucks at Grayling, MI. Thirty, first run production, BO Drive Lamps were put on PLS trucks at Grayling, MI for soldier evaluation. Late one evening, he briefed the soldier/drivers on the new light design improvements and assets. He had prepared a survey questionnaire for the driver/soldiers to complete after the test drive. He drove in BO mode with the soldiers that first night and additional nights. The Army's soldiers drove the BO night course for the first time with the new BO light. The response was overwhelming and was its own reward. Unanimously the soldiers thanked Mr. Snyder for finally putting enough light out the front of our military vehicles in BO mode to adequately see the terrain in front of the vehicle. The new lamp is a delicate balance of minimal detection, IR secure and driver forward visibility.

### **Outcome**

The soldier has the finest BO Drive Lamp ever historically produced. It is IR Secure and has a 100,000-hour operating life. It virtually will not fail. It is impervious to vibration failure. It is a direct field replacement for every former lamp produced on all tactical systems and all commercial construction equipment so equipped. Standardization across all platforms has been achieved. The soldiers' driving safety is now secure.

### **Payoff:**

**Saving soldiers lives and injuries in both peacetime and conflicts. Being able to accomplish a vehicle mission at night driving in BO Mode reliable.** The lamps produced over the last twenty years are varying in both cost and questionable usefulness. The newly designed LED BO Drive lamp is about \$50.00 in the supply system. The most recently supplied (old) lamp by a contractor to an OEM was about \$90.00. Aside from being cheaper the new LED lights perform as 12/24 multivolt, have universal vehicle usage, are NATO interoperable and IR secure. The estimated life is 100,000 hours- failsafe, whereas the old lamps may not have made one week! Some have even failed going down the production line at Oshkosh Truck, WI. The greatly increased life and reduced cost of the LED BO lamp design will result in vastly increased reliability, reduced logistics footprint, improved readiness, and greater affordability of BO lamp systems. These benefits would be shared with the Army by other military Services (Marine Corps, etc.) who use similarly equipped vehicles in their fleets.

### **Current Status:**

All four newly developed LED external lighting assemblies are in current production cut in by ECP on the PLS, HEMMT and the HET heavy tactical systems at Oshkosh Truck, Oshkosh, WI.

Commitments by the HMWWV, FMTV, and STRYKER for using the new BO Drive Lamp have been made by the respective Manager's offices.

**Problems in effecting solution:**

None